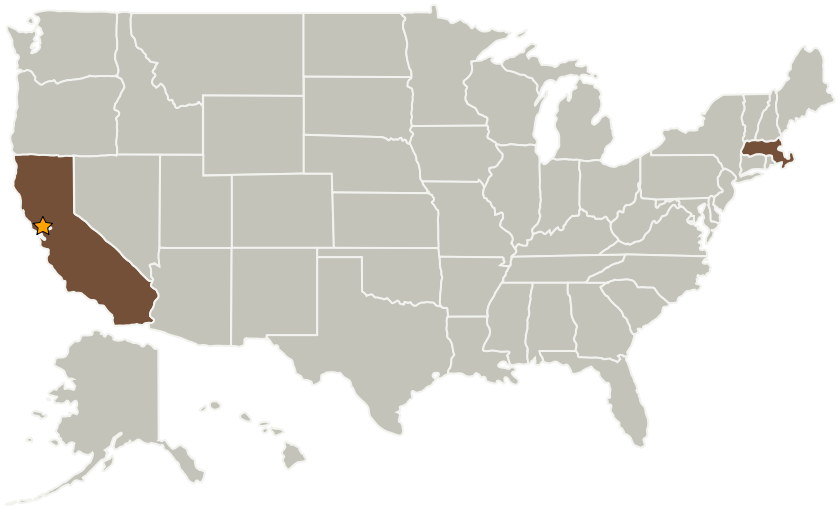
Reconfigurable Environmentally Aware Computing Technology for Earth Observing Systems (7284-060), Phase I

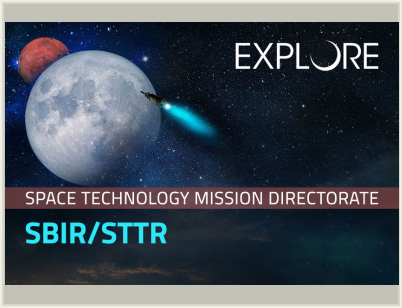
Completed Technology Project (2004 - 2004)

Project Introduction

Over the past decade, many research groups have developed reconfigurable computing systems built from Field Programmable Gate Arrays (FPGAs) for on-board processing of remote sensing data. Physical Sciences Inc. (PSI) proposes to exploit the run-time reconfiguration capabilities of SRAM-based FPGAs to demonstrate an innovative extension to the current state-of-the-art -- an autonomous, adaptive digital signal processor. PSI?s Reconfigurable Environmentally Aware Computing Technology (REACT) will automatically customize applications executing on a reconfigurable FPGA processing system based on external inputs. In Phase I, we will validate the REACT concept by processing images from a digital video camera with a variable-precision 2D integer wavelet transform in a Xilinx Virtex-II FPGA. Wavelet transforms enable image data compression with dynamically tunable compression ratios. Quantization of the filter coefficients will be controlled by a master state machine with inputs from a GPS receiver and PSI?s SEU Alarm, a compact sensor that monitors the surrounding environment for radiation hazards. Furthermore, PSI will develop a Phase II system design capable of performing a full-scale demonstration using hyperspectral imagery.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Physical Sciences, Inc.	Supporting Organization	Industry	Andover, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robin L Coxe

Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.1 Situational and Self Awareness
    - TX10.1.3 Knowledge and Model Building